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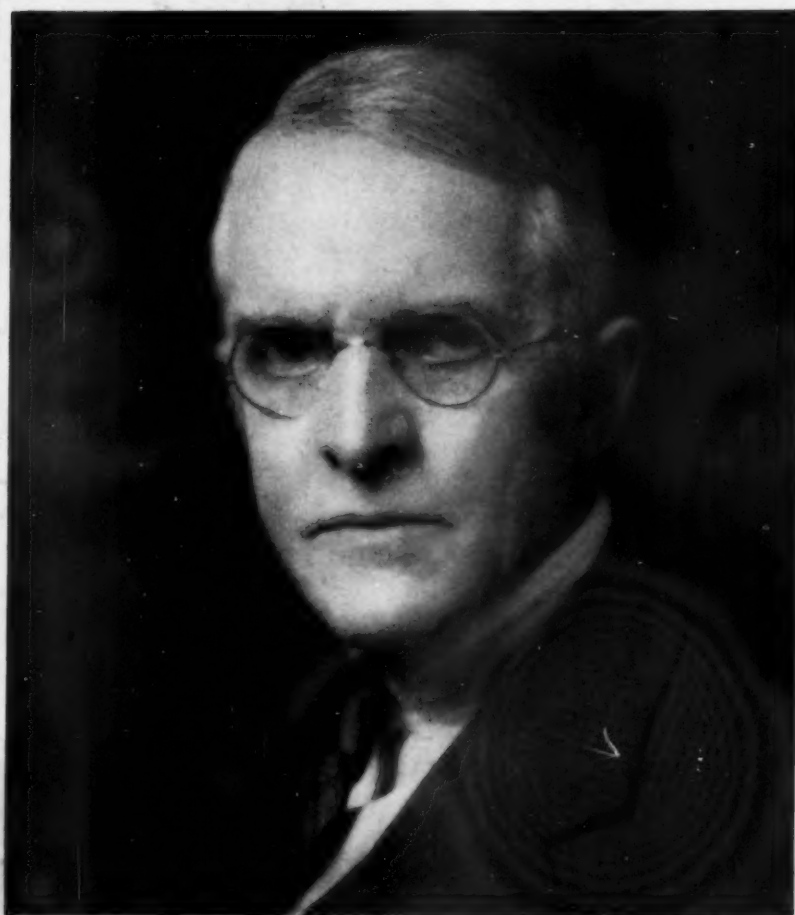
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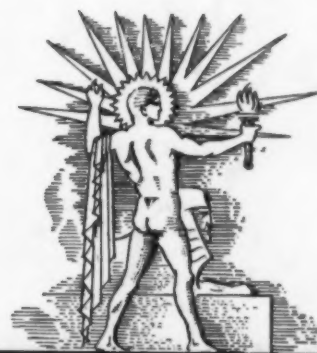
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



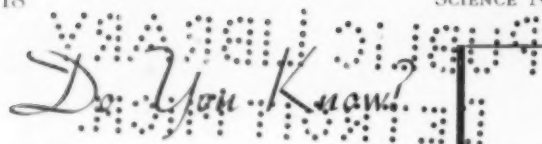
President, AAAS

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January 8, 1938

A SCIENCE SERVICE PUBLICATION



Birds in winter appreciate suitable shelter as well as bread crumbs.

Germany now has six whaling fleets working to increase her supplies of oil.

Jellyfish are usually known as sea creatures but a few kinds live in fresh water.

The Empress Josephine collected 250 varieties and species of roses in her garden.

Foreign radio programs are arousing increased interest in study of foreign languages.

The first iron produced in this country was made into a one-quart pot, still in existence.

Yellow asphalt for pedestrian crossings has been tried in England to make these walks conspicuous.

One noted physician declares that man's future will depend very largely on what he decides to eat.

Indians of Panama carried their burdens fastened to ends of a pole on their shoulders—coolie fashion.

Lambs produced and sold out-of-season are known to the trade as hot house lambs and usually bring high prices.

Some Central American Indians wore thick armor jackets of cotton, which gave good protection against pikes and lances.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.

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PUBLIC HEALTH

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The Field Museum has a unique exhibit of birds no human being has ever seen alive, the birds being reconstructed from fossil remains.

An Englishman has patented in the United States a camera, which not only takes moving pictures but can be used to project them on a screen.

Sheep from Vermont, introduced into Australia as wool-growing stock, proved unable to adapt to the conditions there.

The public feeding of the bears in Yellowstone Park each evening is sometimes attended by extra guests—ravens, coyotes, and seagulls.

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PLANT PHYSIOLOGY

\$1,000 AAAS Award Given For Paper on Root Pressure

Young Rockefeller Institution Scientist's Demonstration Revives 210-Year-Old Theory; Upsets Modern Concept

FOR SHOWING that the pressure of sap in plants is "vital," resulting in processes that are living and not just mechanical;

For demonstrating that tiny roots develop enough pressure to send sap higher than the world's tallest trees;

For upsetting radically the most widely held theory of plant science and showing that the father of plant physiology, Stephen Hales, had the right idea in his historic but hitherto outmoded experiments of over 200 years ago;

Dr. Philip R. White, youthful scientist of the Rockefeller Institute for Medical Research laboratories at Princeton, N. J., was awarded the \$1,000 prize of the American Association for the Advancement of Science. His paper titled: "Root-Pressure, An Unappreciated Force in Sap Movement" was selected from among the more than a thousand for this high honor.

Working with minute tomato roots grown in glass flasks upon liquid nourishment, with "orphan" roots never serving the stems, leaves and luscious red fruit of tomato plants, Dr. White has substantiated the centuries-old theory of root pressure. (See SNL, Jan. 1).

These roots growing detached, much as the famous chicken hearts of Dr. Alexis Carrell beat in tissue culture test-tubes for years, develop vast pressures. They push out the water amazingly.

Whereas Stephen Hales, likewise young and experimenting in old England of 1727, was able to show root pressures of only 1.4 atmospheres, some 20 pounds per square inch, enough to raise water 48 feet high. Dr. White 210 years later has found his tomato roots continued to do their stuff, secreting liquid even when opposed by pressures sufficient to raise water 200 feet high. No tomato plant ever grew nearly that high. Yet it had the pressure necessary to deliver water from the earth to the utmost tops of California's big trees.

This great pressure is "insignificantly small" compared with what Dr. White expects to demonstrate when he can get his delicate apparatus attached to the tiny root vessels to withstand such stresses.

Whence comes this amazing pressure? It is a manifestation of life. It is a victory for the vitalists. It is "metabolic," the result of the root cells' feeding and growing.

It may do more than win prizes. It may throw important, needed light on the mechanism of secretion, one of the basic processes in living things.

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PLANT PHYSIOLOGY

Winner "Flabbergasted" Sees Many Problems Ahead

By DR. PHILIP WHITE

Rockefeller Institute for Medical Research
Princeton, N. J.

I CAN ONLY say that I am quite flabbergasted at the award but it will certainly spur me to continue my research.

Interesting as this particular problem is, and great as are its potentialities in helping to solve problems of glandular action, my own feeling is that it should be considered only one phase, one small limb of the tree of problems growing out of the field of root cultures.

Most of my efforts in the past have been devoted to studying the nutrition of these roots, to laying of sound background of knowledge of their normal behavior. An initial result was reported in the Boston meetings of the American Association for the Advancement of Science in 1933. That background has not yet been fully completed, but it is sufficiently so to make it possible to branch out into promising applications of the method.

Applications

Cultivation of viruses of the type studied by Stanley in these roots, reported at the Microbiological Congress in London in 1936, was one such application. This study of the glandular activities of roots is a second application.

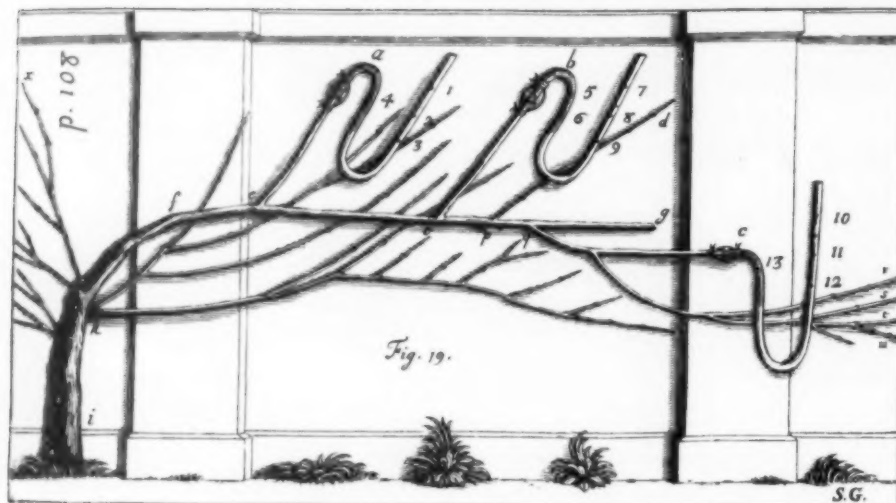
It would be bad psychology to suggest what other applications we may find, but such certainly will arise. I am sure there will be no dearth of future problems.

Science News Letter, January 8, 1938



HONORED

Dr. Philip R. White upset a widely held theory of plant science and won distinction with his experiment demonstrating root pressure. On the right are shown four stages of assembling the manometer setup he used to measure the extremely high pressure generated by excised tomato roots. Particularly difficult was the problem of making the joint strong and tight without crushing the root.



SAP PRESSURE, 210 YEARS AGO

This figure, from Stephen Hales' "Vegetable Staticks," published in 1728, shows how the pioneer plant physiologist set up his manometers to measure the pressure of sap from "bleeding" grapevines trained against a wall.

BIOLOGY

Secret of Sex Determination Sought With X-Ray Studies

Sex Changes in Fish, Vitamin Needs of Plants, Homing Instincts of Toads Discussed at Meeting

SEARCH for the secret of sex determination was described by Prof. J. T. Patterson of the University of Texas, to the American Association for the Advancement of Science. It was a sort of microscopic game of billiards, with X-rays for cues and chromosomes, or rather bits of broken chromosomes, for balls.

Some years ago, Prof. Herman Muller, a former colleague of Prof. Patterson at the University, showed that chromosomes, with the genes or hereditary units they carry, can be broken apart and rearranged by bombarding the cells with X-rays. Prof. Patterson used this technique for the special purpose of locating if possible the sex gene or genes.

According to one of the two alternative theories of sex-gene location, this important hereditary unit is located on one particular chromosome, the so-called X-chromosome. This minute structure Prof. Patterson proposed to shatter with the X-rays. The animals used were the familiar little fruit-flies, classic subject for genetical experiments.

"If the X-chromosome does possess a major sex gene some of the fragments

into which the chromosome can be broken would be certain to contain this gene," Prof. Patterson explained. "By adding separately each of the several fragments to the normal chromosomal complex of the male fly, one can determine whether any one of them possesses the postulated sex gene; for if it does, the male would be changed into a fly with female characteristics. By subtracting the corresponding fragment from the chromosomal complex of the female, a change to maleness would result."

No Verdict

The experiments to date have come to a tantalizing state of no verdict. All fragments of the X-chromosome which have been broken off and re-attached elsewhere in the manner described by Prof. Patterson have yielded no results at all. Evidently the sex gene is not in or on them.

But there is one fragment, from near the middle of the X-chromosome, that has not yet been successfully attached in any male. Instead of surviving and

developing the looked-for female characteristics, the insects simply die.

"The failure of such males to survive may lead some to assume that the small fragment contains a major sex gene," Prof. Patterson stated. "Such evidence is negative and not critical, so that it will be necessary to obtain positive evidence before a final decision can be reached."

Fish Change Sex

Females of Siam's famous fighting fish can be turned into males by surgical operation. If their ovaries are removed, new sex glands may form at the ends of the cut oviducts, but they will be male, not female.

So reported Drs. G. K. Noble and K. F. Kumpf of the American Museum of Natural History, before an audience of experimental zoologists. They obtained seven positive results from 150 operations.

With the growing of the new male sex glands came changes from femaleness to maleness in the external appearance of the fish. The typical trailing, veil-like fins and tails developed.

Three of the seven fish were killed for dissection. The remaining four were given females as mates. Three of them fertilized the eggs in normal manner. The fourth went through normal male behavior, but was unable to fertilize the eggs.

Vitamin B₁ For Roots

Vitamin B₁, preventive of the Oriental disease beri-beri in human beings, is necessary for the production of roots in plants, experiments reported by Dr. James Bonner of the California Institute of Technology have demonstrated.

In the normal seedling (peas were used in the tests) the roots get their vitamin from the cotyledons or thick seed-leaves. But if the root is detached and grown in a nutrient solution, it lives on its reserves of vitamin B₁ for a time, after which the vitamin must be supplied from an outside source.

Dr. Bonner's experiments have shown that two atom-groups in the vitamin's complex molecule are the really necessary parts so far as root growth is concerned. These are known respectively as vitamin thiazole and vitamin pyrimidine.

Toads Want to Go Home

Toads have homing instincts as strong as those of pigeons, though they may not travel quite so fast, Dr. Ray J. Nichols of the University of Mississippi discovered in studies reported.

Dr. Nichols visited a certain area frequently during a summer and fall, marking all toads he could catch with identifying tags and carrying them various distances from the point of capture. Of 141 toads removed one mile or less from "home," 63 were subsequently recovered. Thirty of them had found their way back to the home territory in from 2 1/2 hours to 24 days.

Miniature Cannibalism

Cannibalism is not a monopoly among saw-toothed South Sea Islanders and wild black men of Central Africa. It exists far down in the sub-human world, among the one-celled animals, the protozoa.

Dr. A. C. Giese of Stanford University reported cases of protozoan cannibalism which he has studied. The successful eaters of their brother-microbes frequently become giants of their kind.

Old Fort a Science Outpost

Deep in the heart of Africa stands an old fort, built by the Germans as a World War stronghold. It is now an outpost of science, whence attacks are made on much smaller enemies than soldiers, but in their way deadlier—the dreaded tsetse flies, carriers of African sleeping sickness.

Here labor scientists who are trying to rid Central Africa of this depopulating scourge, stated Dr. P. J. Parrott, vice-director of the New York State Agricultural Experiment Station at Geneva, N. Y. Dr. Parrott saw the fort-laboratory during a recent scientific trip that began at Cape Town and ended at Cairo.

Another scourge of Africa, also depopulating in its effects though less directly so than the tsetse fly, is an importation from the New World; the prickly-pear cactus. Tradition says it was originally brought in in 1750 and used for fencing and for its fruits. Now it is ruining thousands of acres of farm and pasture lands, as it did in Australia.

The same means that broke the grip of the Australian prickly-pear plague are being tried against it in Africa, Dr. Parrott reported. The *Cactoblastis* caterpillar and other cactus-eating insects have been imported from Australia. Their success in Africa is proving much less spectacular, however.

Grasshopper Heartbeats

An apparatus that makes a permanent record of the secrets of the heart of a grasshopper was demonstrated by Drs. Frederick Crescitelli and Theodore L. Ahn, of the State University of Iowa. It writes down all oc- (Turn to Page 30)

GEOLOGY

Lost Continent Sought With Artificial Earthquake at Sea

Geologists Hear of Coal Age Dustbowl, Migrating Beaches, Origin of Mountains and Earth Itself

HUNTING for evidence of the lost continent of Appalachia with TNT and a ship-load of instruments has occupied Dr. Maurice Ewing, Lehigh University physicist, for several years. Long believed to be the source of much of the sedimentary rock on the Atlantic seaboard, Appalachia was only a theoretical and unreachable region until recently. Dr. Ewing described to the meeting of the Geological Society of America the equipment which he, cooperating with explosives engineers and geophysicists, has developed to aid in the search.

Adapting for undersea use the "artificial earthquake" methods used by petroleum geologists in the search for concealed oil-bearing structures, Dr. Ewing has designed a complete series of instruments, consisting of two bombs, four seismic listening instruments and a timing and recording device, for use on the sea bottom.

Strung out on a cable, like the knots in a kite tail, the instruments are lowered over the side of a moving ship, and laid out on the ocean floor. Then, after enough time to permit placing, automatic machinery sets off one explosive charge, and the instruments record the vibrations set up by it. Later the second charge is set off, and recorded by the automatic machines. Then the machinery is drawn to the surface, and the records studied.

Sending a sound wave down through the rocks and recording the time between the explosion and the arrival of the reflected waves tells geologists where changes occur in buried structures. By using his newly-developed equipment, Dr. Ewing hopes to find out what rock structures lie below the sea bottom even when three miles of water cover it.

Cooperating in this work were the Geological Society of America, which



SCIENTISTS RELAX

Humorously pondering the fate of the universe, the high priest of Mineralasia, guarded by two stalwart savages, awaits his cue. This scene is part of the annual Pick and Hammer show, at which Washington geologists satirize their profession and tell apocryphal stories of field experiences. The director of the show is in the foreground.

supplied money from its Penrose Fund, the Woods Hole Oceanographic Institution, which loaned its research ship, the Atlantis, to Dr. Ewing, and engineers of the E. I. du Pont de Nemours Company, who worked out special explosive equipment with Dr. Ewing.

Coal Age Dustbowl

Wind-scarred rocks, grim evidence that Colorado endured a desert climate a quarter of a billion years ago, while luxuriant rainforests thrived in coal-forming bogs in the eastern United States have been discovered in the upper layers of the Fountain Sandstone. They were described by Dr. W. H. Schoewe, University of Kansas geologist.

Found in the upper layers of the sandstone that forms the red pinnacles and buttes on the Rocky Mountain front, these stony evidences of ancient dustbowl conditions are the first of that age found in the United States. Swirling dust of 250,000,000 years ago carved the rocks into easily recognized sharp-edged forms, which were buried in the desert sediments laid down in the desert bed of a drying sea. Later desert deposits covered them. Today, they are just being exposed again as the surrounding rock wears away. Other similar stones have been found nearby in rock beds of later ages, says Dr. Schoewe.

Beaches Go and Come

California's beaches are cut away during the winter, and built up during the summer, according to many observations made during the past generation. Studies of the ocean floor near these beaches, reported by Drs. U. S. Grant and F. P. Shepard, oceanographers of the Scripps Oceanographic Institution at La Jolla, Calif., show that the sea floor is changed as the beaches advance and recede.

Near Santa Monica, the sea floor was built up as the beaches were cut away, while at La Jolla the sea was deepened for at least 1,000 feet from shore when the shore was cut away.

America Wearing

Rain and snow, floods and dust storms, are wearing away North America. It is only a matter of years until it will be all worn away to sea level, provided the continent does not rise as it has done in the remote geologic past. The speed of this wearing away, and how it will progress during the distant future has been studied by Dr. Alfred C. Lane, Tufts College radioactivity expert, who reported that erosion proceeds very much like radium disintegration.



GALL INSECTS AND INSECT GALLS

Largest collection in the world of these interesting objects was shown in Indianapolis by Prof. Alfred C. Kinsey of Indiana University.

Suppose, said Dr. Lane, that the average elevation of North America is 2000 feet above sea level, and also that the continent is wearing away at the rate of 1 foot in 1000 years. Then, according to some theories, the entire continent would be worn away to sea level in two million years. According to Dr. Lane's theories, this is not the case at all. The erosion rate does not remain constant as the lands wear away. Removing the second foot would not take 1000 years, but longer.

Using his formulae, Dr. Lane calculates that to wear away 200 feet from North America would not take 200,000 years, but a much longer time—eighteen million years.

Blisters Make Mountains

Blisters of hot materials deep in the earth, followed by undertows of viscous molten rock, may cause the building of mountain ranges, according to a theory of mountain-making presented by Dr. John L. Rich, University of Cincinnati geologist. When a mass of rock is heated by radioactive disintegration, a blister is formed as the rock expands. As the blister rises, the surrounding area sinks, in part because of the deposition of materials on it as the elevated blister is eroded. Deep in the earth, currents

of rock are set up, which continue until a pressure-balance is reached.

Atoms Shape World

Submicroscopic atoms of radioactive elements, disintegrating and producing heat, may be responsible for the present terrestrial topography, according to a theory presented by Dr. Bailey Willis, Stanford University geologist, who returned recently from a year's research in the south Pacific area.

Radium and similar elements, irregularly distributed through the earth's crust, cause local "melting spots" as it breaks down into simpler materials such as helium and lead, with the release of heat, according to this theory.

Eventually, the local "melting spot," technically named an asthenolith, grows, migrates, and causes intrusions of molten material into and under the surface rocks. Our mountain, plains, lava flows, and sea basins are thus all the result of terrestrial "hot boxes."

Cores in Mountains

Cores of once-molten rock, resembling gigantic inverted duckpins, recently discovered in the Henry Mountains, of Utah, were described by Dr. Charles B. Hunt, of the U. S. Geological Survey.

Rising through sandstones and shales during the early Mesozoic period, when

dinosaurs were lords of all creation, these rock masses have narrow necks where the surrounding rocks were hard, and spread out when they encountered weaker materials.

Cubic Miles of Ash

Fifteen cubic miles of volcanic ash were ejected by Mt. Mazama, of which Crater Lake, in Oregon, is a remnant, during its lifetime of perhaps a million years. Rising from the ruins of older volcanoes during the ice ages, Mt. Mazama grew to be a 15,000-foot, ice-shrouded volcano by the piling up of layers of lava flows from the central crater.

About 10,000 years ago, great eruptions, like those at Mount Pelee, threw out fifteen cubic miles of volcanic ash and poured clouds of hot vapors 35 miles down nearby valleys, Prof. Howell Williams, University of California volcanologist, reported. Then the top of the mountain fell in. Minor recent eruptions built two small cones within the dying crater, and the waters of the present vast blue lake accumulated. The eruption of 10,000 years ago resembled the cataclysm that destroyed Krakatau, in Sunda Strait, in 1883. Less violence would have produced a crater like Kilauea's.

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ANTHROPOLOGY

Fiji Islanders Dress for Dinner; Annoyed by Guests in Shorts

Home Planning for Polygamous a Problem Among Primitives of Alaska, Anthropological Members Hear

FIJI Islanders dress for dinner, and take their etiquette seriously. So the American Anthropological Association, meeting at New Haven, was told by Miss Dorothy M. Spencer, who reported studying manners and tact among natives whose very name Fiji is used to suggest wildness.

Repeating a Fiji dinner party faux pas, as told her by a native, Miss Spencer said:

"People of his village extended a dinner invitation to the district commissioner and his assistant, who were Europeans. With best of intentions probably, the officials attended the dinner party attired in shorts, a costume which the natives well knew to be an informal one, reserved for working hours, field excursions, and the like.

"The men were furious, and the women, too, felt themselves insulted that they would be forced to serve such unmannerly foreigners."

Entering a Fiji house, Miss Spencer said, it is etiquette to walk in front of any seated individual. Walking behind him is rude, for the good reason that a "hostile-minded person would be in a good position to deal the man a blow when he passed behind his back."

Good manners are so vital, in Fiji circles, that one chief shot himself rather than live after his younger brother spoke to him disrespectfully.

Navajo women have stopped making

pottery bowls, and almost given up making baskets, and no wonder!

Here are some of the accidents supposed to make trouble, or spoil a Navajo basket, as reported by Harry Tschopik, Jr., of Peabody Museum, Harvard University.

No one must watch while the basket is made—the basket will be sure to break.

No one may step over the materials. The basket maker must not swear.

She must work always on the concave surface of the basket, because if she turned it over, she would lose her mind.

After the design is started, a basket maker may eat meat and bread, but no salt.

There are plenty more requirements, but this gives an idea. A basket that is not made right is considered no good in ceremonial sings for healing the sick, where the baskets are mainly used.

Mr. Tschopik said that the basket making conditions he described are those of Navajos of Ramah, New Mexico.

Planned for Two Wives

How to arrange a house for two wives is a problem that Ten'a Indians of Alaska have solved. These Indians often have two wives, and generally choose sisters, Rev. Robert J. Sullivan, S. J., who spent the past winter in their villages along the Yukon River, reported.

In a two-wife household, the husband

keeps his things along one side of the house, midway between front and rear walls, he explained. The first and more important wife sits, and keeps her belongings, between the man and the entrance. The other, less important wife gets the place on the other side of the man, near the rear.

According to Ten'a etiquette, it is rude for a woman to pass in front of a man, Father Sullivan explained. The first wife, established near the door, can go out for food or for household duties without walking in front of her husband. The second wife isn't important enough for any one to care if she does walk in front.

Children of Ten'a Indians get what they want by the sure-fire method of crying for it. Parents cannot stand tears, and will give their babies almost anything for which they cry, Father Sullivan observed.

Soil Saving Methods Old

Ancient farmers in Mexico used exactly the same techniques for conserving soil that modern engineers advise.

Reporting her observations in southern Mexico, Miss Emma Reh, of the Catholic University of America, told of finding Indians in the Mixteca region planting their steep, mountain-side fields and using time-honored devices to keep the soil from washing away.

Their soil conservation ideas include leaving strips unplowed with native vegetation cover, and building retaining walls of stone along contour lines through the fields. The walls are reinforced by planting maguey. Indian farmers also block gullies with stone walls, built in series like stairs, to break the rush of water during heavy rains. The Indians are often late with their precautions, and complain that "The soil runs off our fields like grease off a hot griddle."

"A steep field may last two to five years, and then it has to be rested for a long time or abandoned," said Miss Reh. "The Mixteca is typified by barren eroded hills and mountains, -probably despoiled by man."

Evidence of the ancient Indian struggle against soil erosion is found on mountain sides, which are marked from the top down by ridges like stairs, banked by stones, by means of which the Indian lords, soldiers, and common people were able to farm.

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Thousands of alder bushes are being planted in the Swiss Alps to check the snow from sliding down in avalanches.

ARCHAEOLOGY

Lithic Laboratory Will Study Stone Age Arts

LOST arts of the Stone Age are to be re-discovered, in a brand-new project of science. A Lithic Laboratory, opening its doors January first, will have for its task the study of stone implements, such as Indians of eastern United States used to turn out by thousands.

Dr. H. C. Shetrone, director of the Ohio State Museum, and also of the laboratory, announced the opening to the American Anthropological Association. The laboratory will be at Ohio State Museum, Columbus.

"Chipping of flint, as such, is not a lost art," Dr. Shetrone emphasized. "Many people have been able to duplicate common types of prehistoric stone tools. But elusive techniques have been forgotten, and to the layman constitute a lost art."

Lost arts of Stone Age man, he explained, include making thin, slender knives out of flint or obsidian, which is a brittle black volcanic glass. Another forgotten art is how to flute a stone dart in the manner used by the oldest known American hunters, the ancient Folsom Men who pursued mammoth and bison in the wilderness.

"It is an interesting observation," said Dr. Shetrone, "that primitive man could do something which, with our vaunted civilization, we so far have not done."

The Lithic Laboratory, by studying types of stone tools, techniques of making them, materials used, and other facts, expects to gain valuable information about the American aborigines. Their tools are clues to their origin, relationships of one group of natives with another, their wanderings, and trade routes.

To learn more about these prehistoric events, Dr. Shetrone said, "samples of flint, worked and unworked, from all sections of the eastern United States will be assembled in the Laboratory for purposes of study."

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MEDICINE

Rat Cherishes Squab Instead of Eating It

THE spectacle of a healthy, grown-up female rat cherishing and mothering a tender young squab, just because a few drops of a hormone from the pituitary gland had been injected into the rat's body, was described by Prof. Charles R. Stockard of Cornell Univer-

sity Medical College at a meeting of the New York Academy of Medicine.

Prof. Stockard used this phenomenon, discovered by Dr. Oscar Riddle of the Carnegie Institution of Washington's laboratories at Cold Spring Harbor, to illustrate the powerful influence that hormones or gland secretions may exert on the body of man and other animals. The rat he talked about was a perfectly normal rat that ordinarily would have made a prompt meal of the tender meat of the squab. The only difference in this rat was the few drops of hormone.

Hormones have other effects on the body. Together with the nervous system and brain, they are responsible for all the different parts and mechanisms of the body working together as a whole. Hormones and nerves, moreover, depend on each other. Nerves stimulate glands to secrete hormones and hormones stimulate nerves to control muscles, even in such simple movements as those involved in walking and talking. Which of the two is more important may be surmised from the fact that hormone control is an older and more primitive method of integration than the nervous mechanism. Plants, for example, do not have anything like nerves, but they do produce hormones for controlling and integrating life processes. One of these, a growth-producing hormone, has actually been isolated from the tips of young plants.

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GENERAL SCIENCE

Prof. Wesley C. Mitchell Named AAAS President

See Front Cover

FOR the first time in many years a representative of the social sciences was elected to the presidency of the American Association for the Advancement of Science when Dr. Wesley C. Mitchell was chosen to head the organization next year.

Dr. Mitchell is professor of economics at Columbia University and director of research of the National Bureau of Economics Research in New York City. He holds doctors' degrees from the University of Chicago and Columbia.

Dr. Mitchell was born in Rushville, Ill., 63 years ago. He has gained recognition as a student of business cycles. In addition to his long career as an economist and teacher, he has served on many government technical committees. He served as chairman of the President's Committee on Social Trends from 1929 to 1933. He was a member of the National Resources Board, 1934-35.

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IN SCIENCE

ENGINEERING

Calls For Non-Tamperable Fuses For Fire Prevention

USE of a new type of non-tamperable plug fuse, which cannot be altered to permit overloading electrical wires, is urged as a safety measure by Dr. Morton G. Lloyd, chief of the Safety Codes Section of the National Bureau of Standards in a paper prepared for publication in the Proceedings of the International Association of Electrical Inspectors.

Scores of fires have resulted from the practice of bridging fuses or inserting larger ones in an electrical circuit to permit a larger current than the wires were designed to carry, Dr. Lloyd reports.

The new plug cannot be bridged internally and plugs of different ratings are not interchangeable. Eight cases in which persons lost their lives in fires resulting from plugs of the older type which were tampered with are cited as additional proof of the necessity for using fool-proof fuse plugs.

In hundreds of places throughout the United States it is customary either to bridge a fuse to increase the capacity of a particular electrical circuit or to insert a fuse of a larger rating. "The practice," the Standards Bureau scientist asserts, "is analogous to tying down the safety valve on a steam boiler and may have almost as serious results."

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PLANT PHYSIOLOGY

Ultraviolet May Kill Part Of Plant's Growth Hormone

ULTRAVIOLET light and blue-violet visible light make plants grow more slowly by destroying part of the growth hormones, or growth-promoting substances that stimulate their increase in length, Dr. H. W. Popp and H. R. C. McIlvaine of Pennsylvania State College reported to the A.A.A.S. They tested thousands of turnip seedlings under various colored light filters, and found maximum growth-checking effect at the shortwave end of the spectrum.

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ANCE FIELDS

GEOLOGY

North Carolina Gold Mines Operating In New Boom

NORTH Carolina landowners are hunting gold again with more eagerness than at any time since the gold rush of '49 to California closed down all but the most prosperous mines in that state, it is reported.

As a result of present prospecting, additional mines will be in operation by the spring of next year, H. J. Bryson, state geologist and chief of the Mineral Resources Division of the Department of Conservation and Development, predicts.

Six large gold mines in the state are producing \$200,000 worth of the precious metal annually. New additions to the number of plants are expected to boost the total materially.

The most recent gold mine to go into full production is the Capps Mine, Mecklenburg County, owned by a Toronto, Canada, syndicate, it was stated. A new 100-ton cyanide reduction mill was completed a few weeks ago and was placed in production the last week in November. Ore yielding between ten and twelve dollars of the precious metal per ton is being handled in the mill.

One gold mine, located within the city limits of Charlotte, the largest city in the state, has produced \$200,000 worth of gold during the last two years.

Gold mining revived to some extent when the price of gold was boosted to \$35 an ounce in 1933.

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BIOLOGY

Life Seen As Basically An Organizing Process

LIFE IS basically a process whereby things that are simple and random in arrangement in the non-living state become complex and definitely ordered in the living condition. Search for the secret of this organizing process was the subject of an address by Prof. Ralph S. Lillie of the University of Chicago, as presiding officer of the section on zoology of the American Association for the Advancement of Science.

"The vital impulse—whatever its ultimate nature may be—has as its natural tendency or effect the synthesis of beings or systems which combine with complex organization and activity a persistent and characteristic unity," Prof. Lillie said. "No such integration is discernible in the materials before they are thus assembled and unified."

Partial glimpses of the means through which life controls and arranges its raw materials are given in such life processes as those of the genes or hereditary units, of hormones or cell secretions, and of the still-unidentified "organizer" substances that decide where and of what size and shape the various organs of an animal shall be.

In the non-living world, approaches to the same kind of process are seen in the "self-reduplicative" activities of ultraviruses and bacteriophage. These are now pretty generally acknowledged to be large but non-living protein molecules.

Prof. Lillie asked: "Are there constant elements or modes of action in living organisms which are not present in non-living nature?"

To the avowed belief of many scientists that all life can ultimately be reduced to statement in terms of "dead" chemistry and physics, he opposed: "My own conviction is that no merely physical conception is sufficient. But I say this without prejudice to the physical methods of analysis in biology. These are indispensable."

Finally, Dr. Lillie pointed out, life displays "spontaneous or creative activity" which tends to escape the nets of explanation which science would weave for it:

"Science, as science, is concerned with the stable or verifiable characters of organisms; it is these alone that biologists may hope to understand by reference to physical models. The novelty-producing or creative character must be referred to other factors, equally deep-seated and equally characteristic of natural existence.

"Of these factors science can at present give no account; can it ever give an account? The creative is that which escapes or transcends rule; but what is not in accordance with rule lies outside science; in an evolving universe all the rules are not yet made.

"Biologists need not be disturbed by this consideration; the scientific path remains clear and its outlook is fuller of promise than ever before. There is an incomparably rich field in the determination of the natural constants of vital phenomena."

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PUBLIC HEALTH

Three Quarters of a Million Lives Saved Each Year

PROFITS in terms of human lives ran to over three-quarters of a million in one year, as shown by a "profit and loss statement of human lives" issued by the Metropolitan Life Insurance Company. This means that nearly one million human lives, 768,402 by actual count, were saved in one year as a result of modern improvements in medical and health facilities.

The savings were made in the year 1935, latest for which complete data are available. In that year there were 1,207,359 actual deaths of white persons in the United States. If the death rate, figured as deaths per 100,000 population, for the year 1900, had prevailed in 1935, there would have been 1,975,761 deaths in 1935. Subtracting the actual number from the computed number gives the 768,402 lives that were saved in the one year.

The profit and loss statement shows that the human life savings were made by prevention of deaths from eleven different causes. The debit side of the books showed an increase of lives lost due to four causes, but even these increases were not enough to offset the other savings so that the balance shows a substantial profit.

The changes in death rates on the profit side were in tuberculosis, with a saving of more than 173,000 lives; influenza and pneumonia, with a saving of 122,000 lives; diarrhea and enteritis, with a saving of 108,000 lives, mostly infants and young children; chief childhood diseases, with a saving of 59,000 lives; typhoid and paratyphoid fevers, with 33,266 lives saved; nephritis (kidney disease), with 25,999 lives saved; cerebral (brain) hemorrhage and softening, with 16,803 lives saved; diseases associated with childbirth, a saving of 4,486; and all other causes, savings of 349,434 lives.

On the debit side, 58,583 additional lives were lost from organic heart disease; 43,021 from cancer; 12,305 from diabetes; and 10,000 from external causes excluding suicide. This last group would probably have figured on the profit side, the life insurance company statisticians point out, if it had not been for deaths in automobile accidents. Deaths from this cause run well in excess of 30,000 a year.

The possibility of doing still better is recognized.

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MEDICINE

Heart Affliction Seen as Cause of a Kind of Insanity

Malta Fever Reported in United States; Diabetes May Be Caused by Parathyroid Glands; Fig Sap Useful

THE OLD-TIME novelist frequently saw a broken heart as a cause of insanity. Today a modern scientist traces one form of insanity to a physical heart affliction.

Investigations which seem to link the widespread mental disease known as dementia precox with rheumatic heart disease were exhibited before the American Association for the Advancement of Science by Dr. Walter L. Bruetsch of the Indiana University School of Medicine and the Central State Hospital at Indianapolis. The hearts and brains of 8 out of every 100 dementia precox victims that Dr. Bruetsch was able to examine after death showed signs of a chronic rheumatic infection, he reported.

The findings suggest, Dr. Bruetsch said, that the large group of mental disorders which today go by the name of dementia precox will in future turn out to be a number of different diseases with different causes.

Dr. Bruetsch's findings also suggest that the old time novelist who ascribed mental disease to emotional upsets was pretty far off in his diagnosis. Even modern psychiatrists who hold that mental disease is always the result of emotional or environmental stress are wrong, in Dr. Bruetsch's opinion. Changes in the brain tissue, such as the rheumatic condition he found, he indicated, may be responsible for mental disease rather than disturbances in the mental activity of the brain.

Prevent Congenital Syphilis

Prevention of the pitiful affliction of syphilis in unborn infants by making blood tests routinely on all expectant mothers was urged by Drs. Alfred C. Beck and William T. Daily of the Long Island College of Medicine, Brooklyn, N. Y. When the mother is properly treated for syphilis during the months before the child is born, a living, healthy child will be born in 90 per cent. of the cases.

The germ which causes the disease gets into the unborn baby's body from the mother's body. During the early part of the infant's life in its mother's body

it is somewhat protected by covering membranes which act, the Brooklyn physicians believe, as a barrier against the germ. Later this barrier breaks down and unless the mother is treated for syphilis the unborn child is sure to contract the disease. This may lead to its being born dead or to its being born with the disease.

The mother usually has syphilis in a much milder form during the child-bearing months, it was pointed out. Because of this, the disease may not be detected unless blood tests are made. Having a child, in fact, appears to protect the mother from the worst ravages of the disease. Drs. Beck and Daily suggested that certain regular changes in women's sex organs, which also take place during the first months of child-bearing, may produce the factor that protects the mother against the disease.

Malta Fever in U. S.

Malta fever sounds like a strange disease that might be picked up by the traveler in foreign lands, but there is plenty of opportunity for acquiring this unpleasant ailment in the United States, it appears from the report of Miss Alice C. Evans, senior bacteriologist of the U. S. Public Health Service's National Institute of Health. Miss Evans has herself been a chronic sufferer from the malady, acquired in the course of her investigations of it.

In one year about 2,000 cases were reported in this country. There are no figures on the actual total number, which may be much higher than the reported number. Chronic cases rarely are diagnosed correctly, Miss Evans pointed out. Some patients had had the disease for 20 years before the correct diagnosis was made. Symptoms of chronic Malta fever, or undulant fever or brucellosis as it is also known, are exhaustion, insomnia, irritability and a great variety of aches and pains. Because of the symptoms the disease is often wrongly diagnosed as neurasthenia. A mild attack of the disease may be diagnosed as "flu." More severe attacks may be confused with

tuberculosis, typhoid fever, malaria or rheumatism.

No specific cure of proved efficiency exists, Miss Evans declared. It is, therefore, necessary to learn how to avoid getting the disease.

Brucellosis—that is the name Miss Evans uses—is caused by a germ that has the name *Brucella*. These germs attack cattle, hogs and goats as well as man. The relation between the animal and human disease was established by Miss Evans' pioneer research.

Farmers and veterinarians who handle infected animals and slaughterhouse workers who handle infected carcasses get the disease because the germs may pass through their skin, particularly if there are cuts or scratches. Other persons get it by drinking milk from infected animals.

Proper pasteurization or boiling of all milk, Miss Evans declared, would prevent brucellosis in all persons except those whose occupation brings them in direct contact with infected animals. To protect the latter as well as the milk drinking public, the U. S. Department of Agriculture is carrying on an extensive campaign to eradicate the disease from cattle. There is as yet no similar campaign to control the disease in goats and hogs. Miss Evans pointed out that cattle may become infected from contact with infected hogs.

Diabetes From Glands

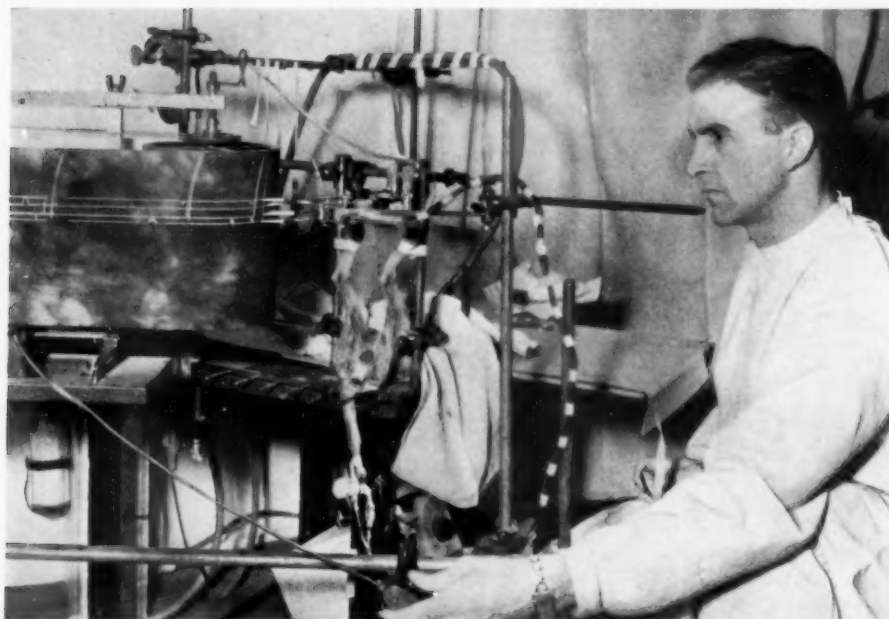
Suggestion that other glands besides the pancreas are responsible for the increase in blood sugar that is diabetes was contained in the paper presented by Drs. Oscar Riddle and Louis B. Dotti of the Carnegie Institution of Washington. Extracts of the parathyroid gland of the throat were found to increase blood sugar in pigeons. The effect was more marked in birds on normal diet than it was on fasting specimens.

Fig Sap For Parasites

Possibility of a new and potent means for combating parasitic worms of human beings and animals is suggested by a report presented by Conrado F. Asenjo of the School of Tropical Medicine, San Juan, P. R. In the milky juice, or latex, of the creeping fig, Mr. Asenjo found a protein substance that attacks the parasites, literally digesting the skins off them. Concentrations as low as one-eighth of one per cent. were found effective.

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Honey has the same bad effect as any other sugar on diabetic patients.



SPINAL LEARNING

With this elaborate apparatus, Dr. P. S. Shurrager (who holds the switch) and Dr. E. A. Culler of the University of Illinois have demonstrated to the A.A.A.S. that the higher centers of the brain are not essential to learning. So long as a dog has the use of three or four inches of his spine, he can learn without use of brain or the senses of vision, hearing, smell or taste. An animal whose nervous system was severed under anesthetic at the neck and in the middle of the back was kept breathing in a respirator and was able to learn in each part separately.

CHEMISTRY

Vitamin B₁ May be Fundamental Component in Evolution

Chemical Society Hears of Experiments With Thiamin Which May Be Synthesized in Bacteria and Plants

VITAMIN B₁, whose lack in human diet causes the dread disease beriberi found mostly in Oriental countries, appears to have a fundamental place in the chemical chain which brings about the process of evolution in both plants and animals. Vitamin B₁ is now being prepared synthetically in the laboratory and is now known as thiamin.

The basic role of thiamin was traced at the opening session of the 7th National Organic Symposium of the American Chemical Society in Richmond, Va. Dr. R. R. Williams, chemist of the Bell Telephone Laboratories, New York City, discussed the nature of thiamin. Dr. Williams isolated vitamin B₁ and by studying its structure has been able to make it synthetically.

As vitamin B₁ or thiamin became

available in quantities sufficient to supply other workers in many fields it became apparent that the chemical was a fundamental substance, not only in the welfare of man, but also in all varieties of living matter, including higher animals, in insects, bacteria, fungi and higher plants.

Many bacteria and plants, declared Dr. Williams, seem able to synthesize within their bodies this essential vitamin in quite the same way that man is able to make his own adrenalin and other hormones. Plants, however, make the vitamin as part of their normal physiological processes. Man does not.

"Evidently the processes for which the vitamin is used by plants and microorganisms are closely akin to those which employ thiamin in the animal

body," said Dr. Williams. "Thiamin, therefore, appears to have to do with a very primitive and elemental function of living matter, presumably devised by nature during early stages of the evolutionary process.

"Plants and microorganisms are somewhat more catholic in their tastes than animals and can make use of a wider variety of analogs and derivatives of thiamin."

Thiamin, Dr. Williams also explained, can act as a coenzyme in the form of its pyrophosphate compound. A coenzyme, he explained, is a component part of the several natural catalysts in the body known as enzymes. The enzymes which involve thiamin have to do with the utilization of starches and sugars for the production of energy or the creation, in the body, of the necessary components of the tissues.

It is this last function of thiamin which explains the diversified nature of the symptoms caused by its absence. The reactions involving thiamin occur in all the tissues of the body, no matter how specialized their function may be, and so a deficiency of the vitamin in the food may impair any one of a number of bodily functions depending upon which tissue or organ is most affected.

New Drying Agent

Better stainless steels, candy, drugs, leather, paper, glass and varnishes are resulting from a new water absorbent now being used by industry. The new absorbent is activated alumina, a granular, white inert solid which can be completely rejuvenated with ease for further use merely by heating. While small scale units for the home have not yet been made available it is possible that the lead of industry may be followed by home use with increased summer comfort.

Activated alumina was described by R. B. Derr of the Aluminum Company of America before the 4th Annual Chemical Engineering Symposium of the American Chemical Society, meeting in Philadelphia.

The drying absorbent is used by industry where almost complete removal of moisture is vital, or a constant moisture content is required, said Mr. Derr.

One hundred per cent. dehumidification is possible, he added, until the activated alumina absorbed from 12 to 14 per cent. of its own weight of water. Large commercial units of activated alumina are now in operation which can remove 15,000 pounds of water daily from the atmosphere.

The absorbent has been particularly useful for the stainless steel industry where any trace of moisture during annealing produces a bluish cast on the metal instead of the bright polish. Another important use is in the manufacture of toxic gases used in household refrigerators which cause corrosion if they contain moisture.

The use of activated alumina to decrease the humidity in the home for better summer comfort has only been partially explored as yet, said Mr. Derr. Mainly this has been because its uses have been developed first for drying equipment in existing or less competitive lines of development. Further, the absorption of moisture by the alumina generates a considerable amount of heat which must be removed; a technical problem somewhat difficult to solve in a home installation.

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MEDICINE

Alcohol, Ether, Exposure Lower Pneumonia Resistance

THE REASON why pneumonia is especially likely to follow exposure to cold, ether anesthesia and alcoholic indulgence or over-indulgence is explained in research reported by Drs. W. J. Nungester and Roy G. Klepser of the University of Michigan's Hygienic Laboratory at the meeting of the Society of American Bacteriologists.

These conditions interfere with the normal action of the epiglottis and the vocal folds in the throat, structures which ordinarily act like curtains, closing over the trachea at the slightest irritation. Since the trachea or windpipe is the passage from the throat to the lungs, it is obvious that failure of these protective curtains would leave the passage to the bronchi and lungs open to pneumonia germs in the air.

The Michigan scientists found that the protective mechanism in the throat failed three times as often in rats that had been exposed to cold as in rats under normal conditions, and more than twice as often in intoxicated rats as in normal ones.

When pneumonia germs were put into the rats' noses, nearly half the rats that had been exposed to cold got pneumonia but only just over a tenth of the rats living in normal temperatures developed the disease. Over a third of the intoxicated rats and over a third of the rats under ether anesthesia developed pneumonia.

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PSYCHOLOGY

Psychologists Puzzled Over Adaptability of Workers

Brain Waves Throw New Light on Sleep; Intelligence Influenced by Good Home; Social Life of Mice Watched

ABILITY of workers to adjust to difficult working conditions and increased demands with an economy that no man-made mechanical device can imitate, is a puzzle to psychologists, Dr. A. T. Poffenberger, of Columbia University, told the meeting of the American Association for the Advancement of Science in his address as vice-president of the section on psychology.

When men have to work in excessive noise or in a room extremely hot or filled with distractions, the output of work may not be decreased, experiments have demonstrated. It is likely to continue at the same level. In fact, in an unconscious attempt to maintain the level despite handicaps, the workers are inclined to overshoot the mark and do even better than usual.

Does work done in noisy surroundings or in excessive heat and humidity take its toll of human energy? Do incentives of all sorts commonly employed to increase effort and thereby to increase efficiency really increase efficiency, or are they more costly when efficiency is properly computed?

These are questions that psychologists recognize but are not yet ready to answer, Dr. Poffenberger indicated.

Each person recognizes his own level, Dr. Poffenberger said. "One thinks of himself as just so good." He also has an aspiration level that represents the achievements he would like to reach. These levels are constantly adjusted in the light of experience.

When difficulties are encountered or the task is unexpectedly made harder, the individual automatically makes an adjustment necessary to keep to his own level of performance and avoid disappointment. After a period of adjustment the output is normal and the effort apparently not increased.

The persons who make this adjustment report that they "are not bothered" or "paid no attention" to the distracting conditions.

Dr. Poffenberger cited two possible explanations. First, the sense organs and musculature may act as a protective

mechanism against distraction and by automatically relaxing they transmit the otherwise disturbing conditions at a reduced level, one too low for competition with the important ones. Second, the hammering at other sense organs may really increase or reinforce the intensity of signals carried by the senses actually employed at the task.

Men And Mice Alike

The rhetorical query, "Are we men or are we mice?" loses most of its significance through studies reported to the American Association by Dr. Jacob Uhrich, of the University of Chicago and Kansas State Teachers College. Dr. Uhrich has found that men and mice are very much alike in some phases of their social conduct.

Male mice fight a good deal, females don't. There is some bickering between the sexes. The severity of the fighting differs from group to group, and within the same group at different times.

There is a tendency for one "boss mouse" to establish dominance over the other males. His rule may last for several months, or he may be overthrown after only a few days.

Brain Waves Chart Sleep

Persons who claim they go to sleep the instant their heads touch the pillows must be wrong, it appears from brain-wave studies of sleep reported by Drs. Hallowell Davis, P. A. Davis, A. L. Loomis, E. N. Harvey and G. Hobart of Harvard Medical School, Princeton University, and the Loomis Laboratory.

Brain-wave studies made of individuals as they went to sleep and the reports of the sleepers themselves indicated that sleep does not come all at once. Different parts of the brain go to sleep in stages, one at a time, and there is a "floating" or drowsy stage before real sleep which shows up in brain-wave records as well as in the reports of the sleepers. This drowsy stage, incidentally, gives a brain-wave record so much like those found in abnormal mental states that the investigators warned that it must be avoided in using brain-wave

● RADIO

January 13, 4:00 p. m., E.S.T.
SAVING MINDS WITH INSULIN—Dr. Z.
M. Lebensohn, St. Elizabeth's Hospital.

January 20, 4:00 p. m., E.S.T.
HOW SAFE ARE YOUNG DRIVERS?—Dr.
Harry M. Johnson, Highway Research
Board.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

records for tests of patients. False diagnosis, it appears, might otherwise be made.

Dreams, apparently, come in more than one stage of sleep. The investigators found that in some cases the sleepers reported dreams when the brain-wave records showed neither alpha waves nor large delta waves. In other cases dreams occurred during the deeper stage of sleep when both delta waves and the 14-per-second waves were recorded.

Adoption Helps I. Q.

Children adopted into good homes as very young infants are likely to grow up with superior intelligence regardless of the intellectual and social deficiencies of their own mothers.

Babies coming from very poor homes and with own mothers of low intelligence levels were tested at the Iowa Child Welfare Research Station from one to five years after entering good foster homes. Prof. Harold M. Skeels reported the results to the American Association for the Advancement of Science.

No child scored below normal. More than half (65 per cent.) are of superior intelligence. No relation was found between the intelligence of the children and their true mothers.

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PHYSICS

New Gas Is Discovered High In Atmosphere of the Earth

Nitrogen Pentoxide, With Two Atoms of Nitrogen to Five of Oxygen, Is Probably Rarest of Gases in Air

A NEW and hitherto unknown atmospheric gas, a combination of oxygen and nitrogen, exists 10 to 25 miles above the earth's surface, Drs. Arthur Adel and C. O. Lampland of the Lowell Observatory, Flagstaff, Ariz., announced to the American Association for the Advancement of Science at the Indianapolis meeting.

It is nitrogen pentoxide, its molecule consisting of two atoms of nitrogen and five of oxygen. It is probably the rarest of gases of the air, present only in the outer regions where the ultraviolet rays of the sunlight bring oxygen and nitrogen into combination.

Existence of the new gas in the ozone layer of the atmosphere was demonstrated by delicate spectroscopy of the far infra-red region of the spectrum. If the new gas existed nearer to earth in the air around us, it would not be detectable by the most refined chemical and physical methods. Because the nitrogen pentoxide takes out certain portions of the sunlight as it comes through the atmosphere to earth, its existence could be detected.

The situation of Lowell Observatory high on a mountain in a dry atmosphere contributed to the discovery.

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PHYSICS

Existence of All Matter Rests on Intra-Atomic Force

THE EXISTENCE of all matter in the world is possible only because there exists an attractive force within atoms that acts only through a distance of less than a million-millionth of an inch. This estimate of the "radius of action" of this fundamental force of nature was presented by Prof. Gregory Breit of the University of Wisconsin in an address before the American Physical Society at Indianapolis.

Prof. Breit—who has been a leading analyst of the theoretical and mathematical implications of this basic force binding atomic particles into the nuclei of atoms, and hence makes possible all matter—reviewed the present knowledge of nuclear structure.

He reported on new measurements at the University of Wisconsin which give additional check on the small magnitude of the distance through which acts the binding force within atoms.

Quantitative experiments by Prof. R. G. Herb and his colleagues with the high-voltage, pressure-tank electrostatic accelerator at Madison have extended

studies of atomic particles (protons scattered by protons) to energy ranges of 2,400,000 volts, said Prof. Breit.

These measurements extend to a new range of energy, the pioneering work of Drs. M. A. Tuve and N. P. Heydenburg and L. R. Hafstad of the Carnegie Institution of Washington on such proton-proton scattering.

The much higher voltage of acceleration employed by Dr. Herb's research

STUDY NATURE SUMMER NATURE CAMP

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Illustrated booklet on request

Prof. George R. Green
Director of Nature Camps
THE PENNSYLVANIA STATE COLLEGE
State College, Pennsylvania

group at Wisconsin, said Prof. Breit, has been possible by the operation of the apparatus within a pressure tank. This tank prevents electrical sparkover and similar losses and permits much more effective operation. Moreover, the unit is very compact for this type of equipment.

An additional refinement in the Wisconsin apparatus has been the discovery that a small amount of carbon tetrachloride (cleaning fluid) or Freon (the new fluid used in electric refrigerators) within the pressure tank will improve the

operation. Now under construction at Washington and at East Pittsburgh are other pressure-tank atom smashers.

The key point of investigations on the forces within atom nuclei, indicated Prof. Breit, is that the apparatus must perform without fluctuation so that the results are quantitative. Only when exact knowledge is attained can theoretical interpretation be made. Qualitative measurements only enable one to make an intelligent guess as to the forces acting within the atom.

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More of the Meetings From Page 21

currences, both mechanical and electrical, which the tiny pump goes through during each pulsing beat.

The apparatus, necessarily exceedingly light and delicate, is made of glass and silver. On one side of a sheet of photographic paper it makes permanent an oscillograph trace responding to the electrical changes. Through the back of the paper it photographs the shadow of a hair attached to the mechanograph.

X-Rays "Paint" Flowers

X-raying flower buds while they were still quite small and closed produced some pronounced changes in color and shape of the flowers when they opened, Dr. Edna L. Johnson of the University of Colorado reported.

White dots, spots, and streaks appeared on the corolla margins of the three species treated—tobacco, phlox, and salpiglossis. The margins in some cases also came out with a dissected or

frayed appearance. In salpiglossis about ten per cent. of the flowers developed as dwarfs.

Buds had to be rayed early in development, or effects were not obtained. Toward the end of the blooming period, normal blossoms appeared in greater number.

Virus Survives Heat

Virus of mosaic, one of the worst diseases that afflicts growing tobacco, is not killed by the heat of flue curing as has been commonly supposed, Dr. J. A. Pinckard of the Tobacco Research Laboratory, Chatham, Va., declared. Laboratory and greenhouse tests with samples of flue-cured tobacco showed the virus to be still alive and ready for action.

The growers themselves are users of flue-cured tobacco for their personal smoking and chewing needs, so that they become "carriers" of the plague to their own fields. Experiments have

shown that young plants infected with the virus from flue-cured tobacco sources actually resulted in losses approximating \$180 an acre in 1937, Dr. Pinckard stated.

How Leaves Keep Cool

Leaves and coolness have long been practically synonyms: photographic studies with the invisible infra-red rays at Iowa State College, by Drs. W. E. Loomis and P. H. Carr, have shown why. Leaves reflect almost all of these heat-engendering rays, instead of absorbing them, as has always been supposed. Thereby they save their own lives; if they absorbed all of the infra-red radiation it would literally cook them.

A curious special condition was observed for the leaves of evergreens, like spruce and pine. In summer they reflect infra-red as all leaves do. In winter, however, they change in some way and absorb it. In this way they are able to keep warm enough to manufacture food on days when they would otherwise be frozen.

Cancerous Protoplasm Thicker

Protoplasm in cancerous and other tumor cells is more viscous, or "thicker," than it is in normal cells, Drs. M. F. Guyer and P. E. Claus of the University of Wisconsin demonstrated before a group of zoologists.

This was shown by whirling cells of both types in an ultra-centrifuge to a force many thousand times gravity. The contents of normal cells separated out into layers or strata much more readily than did those of the diseased cells.

When cancer cells were whirled at a force of 400,000 gravities for an hour, their nuclei frequently divided without the rest of the cell following suit, so that cells with two or more nuclei resulted.

Strange Tadpoles

White tadpoles, two-tailed tadpoles, and other abnormalities were hatched from frog eggs that had been whirled in an ultra-centrifuge and thus subjected to a force many thousand times gravity, Drs. H. W. Beams and R. L. King of the State University of Iowa reported. They suggested that the abnormal color was due to disturbed development of the hypophysis, one of the internal glands.

Two Heads—Two Minds

Two heads are not better than one, if both are on one body and both try to govern it. Being of two minds about what to do in an emergency may result in no action at all, which may result in disaster if danger is impending.

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Two-headed snakes are not uncommon, Dr. Bert Cunningham of Duke University reported. He has been fortunate in having opportunity to watch the behavior of a number of living specimens.

MEDICINE

Cause of Scarlet Fever Believed To Be Virus

A DISCOVERY which seems to upset current ideas of the cause of scarlet fever and which may go far to bring the disease under control was reported by Prof. Jean Broadhurst of Teachers College, Columbia University, and Miss Gladys Cameron of Washington Square College, New York University, to the Society of American Bacteriologists.

They found in the blood and in the throats and noses of scarlet fever patients, small bodies that appear as black dots under the microscope. These black dots—the black color comes from a stain or dye called nigrosin—are called virus inclusion bodies. They are visible evidence of the presence of otherwise invisible viruses.

Scarlet fever is therefore caused by a virus, the scientists believe as a result of their findings. If these findings are confirmed, they will lead to new and probably more successful methods of treating and preventing this serious childhood plague.

Blame for causing scarlet fever has heretofore generally been placed on a different kind of germ, the streptococcus, although some scientists have held that both a streptococcus and a virus, acting together, were responsible for the disease. At present, the streptococcus theory is so widely held that streptococcus toxin is used to test individuals to see if they are immune to scarlet fever, to vaccinate persons against scarlet fever and to inoculate horses in order to secure from them antiserum (antitoxin) against scarlet fever.

"The results in all such control work," Prof. Broadhurst and Miss Cameron pointed out, "are not so satisfactory as with the use of diphtheria in testing, vaccinating and treating diphtheria patients, and this difference is interpreted by some investigators as indicating that streptococci are not the cause, or at least not the sole cause, of scarlet fever."

The two heads may play with each other, or compete for the same piece of food, or even engage in desperate battle to the death. In the latter event, it quite literally amounts to biting the other's nose off to spite your own face.

Science News Letter, January 8, 1938

Some institutions have found blood serum from patients recovering from scarlet fever more successful in treating the disease than the antitoxin made from the streptococcus. The new findings indicate that this may be because the disease is due to the virus, which would be in the blood but would not be in the streptococcus antitoxin. Further evidence in support of this is the fact that virus inclusion bodies were found in the blood of patients who had been given streptococcus antitoxin as well as in the blood of those who had not been given the antitoxin.

Science News Letter, January 8, 1938

PALEONTOLOGY

Ball-and-Socket Joint Found in Dinosaur Skull

WHAT use was there for a ball-and-socket jointed bone at the back of a dinosaur's skull?

Charles W. Gilmore, curator of vertebrate paleontology at the U. S. National Museum, would like to know.

At the back of the skull of a hadrosaur, a rooster-crested monster that once lived in Montana, he has found a bone arrangement that has never been found in any other kind of skull. A relatively small, triangular bone bears on its front edge a socket or cup, which fits neatly over a ball-shaped projection on the bone in front of it.

Whatever was the use of this unique skull-joint, it could hardly have been to make room for the hadrosaur's massive brain. For the hadrosaur's brain was anything but massive. It couldn't have weighed more than two or three ounces. It was enough to see, hear, and probably smell with, but that was about all. But then, very likely a dinosaur never bothered to think—except possibly once in a while about another dinosaur.

Science News Letter, January 8, 1938

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Paleontology

A HISTORY OF LAND MAMMALS IN THE WESTERN HEMISPHERE (Rev. ed.)—William Berryman Scott—*Macmillan*, 786 p., illus., \$7.50. Many new developments and discoveries made since the first edition of Prof. Scott's book and now incorporated, render this new edition practically a new book. The excellent organization of the first edition is preserved, and many of the illustrations, but there are considerable numbers of new figures, and so much added text material that the book is larger by nearly 100 pages than its predecessor. Praise by any reviewer would of course be sheer supererogation; every paleontologist and mammalogist knows that this book is a "must" for the shelf at his elbow.

Science News Letter, January 8, 1938

Physics

THE PHYSICAL TREATISES OF PASCAL: THE EQUILIBRIUM OF LIQUIDS AND THE WEIGHT OF THE MASS OF THE AIR—Translated by I. H. B. and A. G. H. Spiers—*Columbia Univ. Press*, 181 p., illus., \$3.25. This original material has hitherto been available only in a few large libraries. Pascal's writing displays the enthusiasm of the 17th century "pneumatic" chemists who studied the behavior of gases and adopted experimental techniques.

Science News Letter, January 8, 1938

Astronomy

OUR STARS MONTH BY MONTH—Mary Proctor—*Warne*, 92 p., illus., \$1. A simple guide to the constellations with monthly charts of position.

Science News Letter, January 8, 1938

Chemistry

SYNTHETIC RUBBER—W. J. S. Naughton—*Macmillan*, 162 p., illus., \$2.50. A British book for the intelligent layman which summarizes the history, economics, chemistry, physics and technology of synthetic rubber-like materials. It is devoted mainly to Neoprene.

Science News Letter, January 8, 1938

Chemistry

SYNTHETIC RESINS AND ALLIED PLASTICS—R. S. Morrell, ed.—*Oxford Univ. Press*, 417 p., illus., \$11. A very complete British book which will be useful to the chemical engineer and research chemist in this field.

Science News Letter, January 8, 1938

American History

RED CLOUD'S FOLK—George E. Hyde—*Univ. of Oklahoma*, 331 p., \$3.50. The first attempt to tell so complete a his-

tory of a Sioux tribe. It follows fortunes of the Oglalas from mid-seventeenth century, when they were involved in war with the Crees, their westward drive as they followed the buffalo, their struggle with the whites, and their final settlement at Pine Ridge agency, South Dakota, in 1878.

Science News Letter, January 8, 1938

Genetics—Psychology

COLLECTED STUDIES ON THE DIONNE QUINTUPLETS—W. E. Blatz, N. Chant, M. W. Charles, M. I. Fletcher, N. H. C. Ford, A. L. Harris, J. W. MacArthur, M. Mason, D. A. Millichamp—*Univ. of Toronto Press*, various paging, illus., \$4. This includes documentary photographs, fingerprints, records of mental tests and other pertinent data about a very interesting group of children.

Science News Letter, January 8, 1938

Social Science

MAN AND SOCIETY: A SUBSTANTIVE INTRODUCTION TO THE SOCIAL SCIENCES—Emerson P. Schmidt, ed.—*Prentice-Hall*, 805 p., \$5. Thirteen authors, mostly from the University of Minnesota, cover their fields to give the reader a broad orientation.

Science News Letter, January 8, 1938

Library Science

TEACHING THE USE OF BOOKS AND LIBRARIES: A MANUAL FOR TEACHERS AND LIBRARIANS (Rev. ed.)—May Ingles and Anna McCague—*H. W. Wilson*, 207 p., \$1.80. The first edition of this book was planned as a teacher's manual for a special textbook, *Library Key* by Zaidée Brown; in the new edition same arrangement has been kept, but the scope has been broadened to make it suitable for more general use.

Science News Letter, January 8, 1938

Geology

PETROLEUM FACTS AND FIGURES (5th ed.)—*American Petroleum Institute*, 245 p., 75 c. A mine of up-to-date information about the petroleum industry.

Science News Letter, January 8, 1938

Metallurgy

THE TECHNICAL ANALYSIS OF ORES AND METALLURGICAL PRODUCTS—F. D. Hills—*Chemical Publishing Co. of N. Y.*, 201 p., \$3.

Science News Letter, January 8, 1938

Technology

A. S. T. M. STANDARDS ON ELECTRICAL INSULATING MATERIALS—*American Society for Testing Materials*, 373 p., \$2.

Science News Letter, January 8, 1938

Medicine

SOCIALIZED MEDICINE IN THE SOVIET UNION—Henry E. Sigerist—*Norton*, 378 p., \$3.50. With discussion of socialized medicine running rampant in both medical and lay press, this account of what is going on in the Soviet Union, which was "the first country that ever attempted to socialize medicine," is particularly worth reading. Dr. Sigerist points out some of the deficiencies still present in Soviet medical practice, but he believes that these will be overcome in the near future.

Science News Letter, January 8, 1938

Nutrition

MAN, BREAD AND DESTINY—C. C. Furnas and S. M. Furnas—*Reynal & Hitchcock*, 364 p., \$3. This is a highly entertaining discussion of food and diet from every angle—historical, ethnological, nutritional.

Science News Letter, January 8, 1938

Sociology

AMERICA'S 60 FAMILIES—Ferdinand Lundberg—*Vanguard*, 544 p., \$3.75. Who owns and controls America's large fortunes today and how are these fortunes used? This book offers answers to these questions and examines the role of great wealth in politics, industry, education, science, literature and the arts, journalism, social life and philanthropy. The chapters, "Philanthropy, or Non-commercial Investment" and "Education for Profit and Tax Exemption" will interest especially scientists and professors.

Science News Letter, January 8, 1938

Psychology

SEXUALITY IN THE SECOND DECADE—Raymond Royce Willoughby—*Society for Research in Child Development, National Research Council*, 57 p., 75 c. A comprehensive and critical review of the scientific material available bearing on an important phase of the psychology of adolescence.

Science News Letter, January 8, 1938

History of Chemistry

A SHORT HISTORY OF CHEMISTRY—J. R. Partington—*Macmillan*, 386 p., \$2.50. The compactness of this book by a British author is achieved by minimizing—with only a few of the most important examples—the achievements since 1850. Because research in the last half of the 19th and present-day 20th century forms much of the current material of chemistry lectures, it has been dropped in this volume.

Science News Letter, January 8, 1938